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**Claims**

1. Catalyst-containing gas diffusion layer for a fuel cell, which comprises a porous support material and catalyst particles which are distributed uniformly over the entire volume of the gas diffusion layer.
2. Catalyst-containing gas diffusion layer according to Claim 1, wherein the catalyst particles are immobilized on the surface of the porous support material.
3. Catalyst-containing gas diffusion layer according to Claim 1 or 2, wherein the catalyst particles have a mean particle size of from 1 to 100 nm.
4. Catalyst-containing gas diffusion layer according to any of the preceding claims, wherein the catalyst particles comprise noble metals from the group consisting of Pt, Pd, Ru, Rh, Au, Ag, Ir, Os, and/or oxides thereof, and/or mixtures or alloys thereof with base metals.
5. Catalyst-containing gas diffusion layer according to any of the preceding claims, wherein the catalyst particles are present on the gas diffusion layer in a concentration per unit area of from 0.01 to 100 mg of metal/cm<sup>2</sup>.
6. Catalyst-containing gas diffusion layer according to any of the preceding claims, wherein the porous support material comprises woven carbon fibre fabric, carbon fibre nonwoven, carbon paper, carbon fibre mesh, synthetic fibre mesh coated with conductive material, woven polymer fibre fabric coated with conductive material, glass fibres coated with conductive material, foam coated with conductive material or woven metal fibre fabric or metal wire mesh.
7. Catalyst-coated gas diffusion layer according to any of the preceding claims, wherein the catalyst particles are gas-phase-active and are suitable for the oxidation of carbon monoxide.
8. Catalyst-containing gas diffusion layer according to any of the preceding claims, wherein the catalyst particles are gas-phase-active and are suitable for the conversion of carbon monoxide into methane.
9. Catalyst-containing gas diffusion layer according to any of the preceding claims, wherein the catalyst particles are suitable for the oxidation of methanol.

10. Process for producing a catalyst-containing gas diffusion layer according to any of Claims 1 to 9, wherein the catalyst particles are formed on the porous support material by thermal decomposition of at least one precursor compound.
- 5 11. Process for producing a catalyst-containing gas diffusion layer according to Claim 10, wherein the porous support material is treated with at least one precursor compound, is dried and is heat treated, with decomposition of the precursor compound occurring and the catalyst particles being formed and immobilized on the surface of the support material.
- 10 12. Process for producing a catalyst-containing gas diffusion layer according to Claim 10 or 11, wherein thermally decomposable metal compounds are used as precursor compounds.
- 15 13. Process for producing a catalyst-containing gas diffusion layer according to any of Claims 10 to 12, wherein one or more metal compounds from the group consisting of nitrates, carbonates, carboxylates, hydroxycarboxylates, acetates, lactates, butanoates, oxalates, formates, resinsates and ethylhexanoates are used as precursor compound.
14. Process for producing a catalyst-containing gas diffusion layer according to any of Claims 10 to 13, wherein the heat treatment is carried out at a temperature of from 200 to 900°C.
- 20 15. Process for producing a catalyst-containing gas diffusion layer according to any of Claims 10 to 14, wherein the heat treatment is carried out under a gaseous atmosphere, preferably under air, nitrogen, hydrogen or mixtures thereof.
16. Process for producing a catalyst-containing gas diffusion layer according to Claim 10, wherein the production is carried out in a continuous process.
- 25 17. Use of a catalyst-containing gas diffusion layer according to any of Claims 1 to 9 in fuel cells for the removal of carbon monoxide from hydrogen-containing fuel gases.
18. Use of a catalyst-containing gas diffusion layer according to any of Claims 1 to 9 in direct methanol fuel cells for the oxidation of methanol.
19. Membrane-electrode unit for a low-temperature fuel cell, which comprises a catalyst-containing gas diffusion layer according to any of Claims 1 to 9.